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ABSTRACT

The methods with which Northern Illinois University (NIU) has implemented enrollment-management change and developed a more efficient enrollment-management process are noted. Some of the techniques used to better understand the admissions and demand environments and NIU's place in them are discussed to help other institutions with the uncertainties of enrollment-management. NIU's enrollment-management process changes markedly from year to year according to available resources (space, faculty, funding) and student demand. It is much easier to anticipate resource availability than student demand patterns, so NIU's methods of understanding and predicting student demand for new freshman admission are noted. The first step is forecasting the number of high school seniors in the NIU service area. The next step takes place in summer when the Institutional Research Office aids the president and provost in establishing enrollment targets for new freshmen and transfers. An enrollment simulation is performed using a Markov model, and the results give the number of new freshmen and transfers to be enrolled. Once the target for regularly-admissible students is set, attention shifts to forecasting applications, acceptances, and enrollments by ACT/high school rank combinations. To determine what can be expected from this competitive group, a Monte Carlo simulation is performed. Data on applicants and their status are updated weekly so crises do not arise from slow reaction to changes in the environment. The use of an Ad Hoc Admission/Enrollment Committee is invaluable because it hears from offices dealing directly with potential students and can anticipate changing demand patterns not reflected in numbers. (SM)

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Institutional Research's Role in Enrollment Management:

One Institution's Trials and Tribulations

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One of the most demanding and often frustrating tasks facing the institutional researcher is that of enrollment management. What makes this function so demanding is the uncertain and constantly-changing nature of the environment in which enrollment-management decisions must be made. Only through better understanding of the environment, more accurate modeling, and more effective cooperation among affected parties within the institution can better enrollment-management decision-making take place. The purpose of this paper is to show how one institution has implemented the aforementioned changes and, by so doing, has developed an enrollment-management process which is both more efficient and more effective.

Organization and Background

Each fall, Northern Illinois University enrolls approximately 3,500 first-time freshmen and 2,000 new transfers. Most recently, there were more than four applicants for each space available in the new freshman class. In periods of rising demand but severely limited state funding (as is currently being experienced), the University is held particularly accountable by students, faculty, legislators and taxpayers for its management of enrollment levels. Hence, the decisions as to who should be accepted for admission are complex and involve many diverse groups on campus. While the President and his executive cabinet make these decisions based on resource availability and accessibility considerations, the Ad Hoc Admissions/Enrollment Committee advises the President based on the expertise of its members and their access to the relevant data.

This committee is chaired by the Associate Provost (who is responsible for undergraduate education and enrollment) and includes representatives from the following areas: admissions, testing, housing, financial aid, orientation, registration and records, student services, community college relations, and institutional research. The committee was formed to act as an advisory organ to top management as to the conditions and trends of undergraduate enrollment. The committee meets monthly to plan strategies for dealing with enrollment issues, although in "crisis" situations, representatives of some areas (e.g., admissions and institutional research) may meet more often.

The Ad Hoc Admissions/Enrollment Committee has been successful in achieving its goal of providing sound advice to the President on enrollment concerns. Its success can largely be attributed to the synergy it has created in allowing for effective cooperation among the many offices that share in the enrollment-management process. With the committee as a forum, ideas are shared and discussed which lead to better decision-making. Also, the qualitative and quantitative factors affecting enrollment can be put into proper perspective, as some offices focus more on the former and others on the latter.

Although the enrollment-management function existed informally, the need for a formal advisory group was recognized in 1984. The informal process had become too cumbersome, and the view of enrollment management began to shift from estimating enrollment and course demand to one of limiting enrollment and course demand to one of limiting enrollment to meet available resources. Previous to 1984, students meeting minimum requirements of a 17 ACT composite and 50th percentile rank of the high school class or 22 ACT composite and 34th percentile rank were admitted as new freshmen; a 2.0 transfer grade-point average (on a 4.0 scale) was required for transfer admission. These minimum requirements were determined by regression analysis to predict acceptable first-semester grade-point performance.

This accessibility offered to minimally qualified students was lessened greatly by a combination of chronic underfunding by the state of Illinois and an increase in demand for new freshman enrollment. The latter was accomplished by implementing a marketing strategy emphasizing academic quality, diversity of academic programs, and proximity to the Chicago area. From economics it is known that an increase in quantity demanded coupled with a decrease in quantity supplied (i.e., number of openings in the freshman class) creates an increase in the "price" to be paid. This refers not to tuition in NIU's case, but to the "price" of entry; typically this is either represented by performance (as measured by ACT/high school rank), timing, or a combination of the two.

Over the past ten years, NIU has evolved from a "first-come, first-served" approach to admissions to one based on performance at the high-school level. This has been a conscious decision by the faculty and administration to reward performance rather than speed of application, although it raises serious questions regarding accessibility and accountability. For example, some critics have called NIU's performance-based criteria elitist, saying that the students with the fewest options (i.e., minimally qualified) are turned away in favor of high-caliber students, who have many other alternatives to NIU. For Fall 1988, NIU denied admission to more than 2,300 qualified new freshmen applicants. Regardless of enrollment philosophy, these policies are in place and it is Institutional Research's task to take them into account when formulating enrollment-management strategies.

Currently, only those applicants with a 21 ACT and 67th percentile rank (or equivalent) are guaranteed admission if applying before February 1, with admission on a space-available basis thereafter. Of course, special admissions groups (which will be discussed in detail later) are evaluated using different criteria and timetables. It should be noted that the current ACT/high school rank combination necessary for admission will likely drop in the future, as the number of high school seniors in the northern 23 counties of Illinois (NIU's designated service area) will fall precipitously in the coming years (see Exhibit One).

Mechanics

Perhaps it is already obvious that the enrollment-management process at NIU changes markedly from year to year, depending on available resources (e.g., faculty, space, funding) and student demand. It is unfortunate that most of a university's costs are fixed in the short run, and therefore resources are not easily reallocated. Still, it is much easier to anticipate resource availability than student demand patterns, particularly when several different types of admission exist, each with its own patterns and idiosyncrasies. The rest of this paper will discuss the methods used to understand and predict student demand for New freshman admission to NIU.

The first step in forecasting new freshman demand is the forecasting of the number of high school seniors in the NIU service area (see Exhibit One). This is done each spring by compiling Illinois Department of Education enrollment data for each school in the area and using a Markov chain to determine probability rates of transition from one grade level to the next. This method, though simple, has been startlingly accurate, seldom more than one-tenth of a percent in error from year to year. The author and his colleagues have found this technique much more accurate than the often-used Illinois Bureau of the Budget population forecast, which seems slow in responding to interstate migration patterns.

The high school senior forecast is used to determine macro-level changes in population, although county-specific data are easily analyzed as well. While not all seniors in the NIU service area are potential applicants (much less matriculants), this technique provides a better estimate of market potential than do most other methods. For example, if the number of seniors in the area is expected to drop 3.9 percent from Fall 1987 to Fall 1988 (which it is), then if current demand patterns remain constant, a 3.9 percent decrease in applications for Fall 1989 would be expected.

Although quite valuable, the high school senior forecast is not the primary tool used to predict population and market potential, but rather a <u>first-step</u>, macro-level technique. The next step takes place in summer, when the Institutional Research office aids the President and Provost in establishing enrollment targets for new freshmen and transfers. Since the primary enrollment-related concern of the administration is <u>total</u> enrollment (and its effect on resources), it is important to demonstrate the impact of various new-student levels on overall enrollment. To do this, an enrollment simulation is performed using a Markov model similar to the one used to forecast high school seniors. This model computes historical probability rates of transition among class levels at NIU (e.g., the percent of current sophomores who will become juniors next semester) and applies them to current enrollment. The result gives the number of new freshmen and transfers to be enrolled that will lead to

the desired enrollment level if the historical transition rates hold true.

In many ways, the real job of enrollment management starts when the new admission targets are set and the President says, "Meet them." With all the tools at his or her disposal, the wise institutional researcher still knows that meeting specific targets for anything is at best a highly uncertain (and some might say herculean) task. For while the University can control its acceptance of applicants, it has very little control over application flow or the percentage of those students accepted for admission who actually will enroll (i.e., the "show rate"). At NIU, newly-accepted students are asked to either confirm or cancel their enrollment so as to give the University an idea of expected enrollment. In fact, studies have shown little relationship between total confirmations and total enrollment; for Fall 1982 through 1987 new freshmen, number of confirmations explained less than 20 percent of the variance in number of students enrolled (see Exhibit Two).

Because of the uncertainty involved in the prediction of applications and enrollments, the new freshman class must be decomposed into its various admissions categories to better analyze the pertinent patterns. For example, an NIU new freshman class target might look as follows:

Total New Freshman Target:	3,500
Less Special Admissions Groups: (CHANCE, Sponsored, Other)	710
Equals: Those needed from "most competitive" and "competitive" groups	2,790

Each of the special groups has its own unique admissions patterns. It would be foolish to treat the new freshman class as one large, homogeneous group. CHANCE students, for example, are economically and/or educationally disadvantaged, largely minority applicants who do not meet NIU's minimum regular qualifications yet are capable of succeeding at NIU. Sponsored students also may not meet regular admissions standards, but are sponsored by an academic department (often Art or Music) that deems the students worthy for admission into a particular program. CHANCE has a very low acceptance rate and Sponsored a very high rate, yet both have much higher show rates than regularly-admitted students (see Exhibit Three).

Once the target for regularly-admissible students is set, attention is shifted to the forecasting of applications, acceptances, and enrollments by ACT/high-school rank combinations. The group deemed "most competitive" (21 ACT/67th

percentile rank or equivalent) is the primary concern at this point. For if the regularly-admitted portion of the new freshman class can be filled by this group alone, there is no need to accept lower ACT/class-rank combinations.

To determine what can be expected from this most competitive group, a Monte Carlo simulation is performed. The basic idea of Monte Carlo is that probabilities of certain events can be approximated by a sampling process based on a specific probability distribution. Monte Carlo generates random values from a uniform probability distribution (i.e., each value has an equal chance of being chosen) and then transforms the random number into a meaningful value based on the specific probability distribution deemed appropriate for the issue at hand. This specific distribution is usually a subjective estimate gotten through the use of a Delphi technique or a survey of knowledgeable persons, for example.

At NIU, the Monte Carlo model has been used successfully to help predict enrollments for various admissions groups. Subjective probability distributions are developed from historical data and expected patterns to reflect the familiar "low-most likely-high" estimates. These are translated into triangular density functions and, using LOTUS 1-2-3, transformed into a meaningful cumulative probability distribution (see Exhibit Four). More detailed information and examples of Monte Carlo models using LOTUS 1-2-3 are available from the author.

One of the benefits of using Monte Carlo is that it forces top administrative personnel to see admissions targets as parts of continuous probability distributions rather than just discrete points. It is important for administrators to become involved in the setting of the "low-most likely-high" estimates <u>in addition to</u> the actual targets. If administrators could set a target of 3,450 to 3,550 new freshmen rather than <u>exactly</u> 3,500, it would spare institutional researchers the "shame" of having missed a virtually impossible-to-reach point.

After preliminary demand estimates are reached using Monte Carlo, applications begin to flow into the University. At NIU, data are available on applicants and their status via a file on magnetic tape, which is updated weekly (or more often if desired). This enables the Office of Institutional Research to perform detailed analyses so quickly that seldom does a crisis arise because of slow reaction to changes in the environment. For example, if applications from the most competitive group are much higher than anticipated (as was the case for Fall 1988), action can be taken to implement a deadline for receipt of applications. Conversely, if applications are down more than expected, the deficit can be made up from the "competitive" group. Therefore one of the most valuable resources at NIU for enrollment management is access to current, accurate information for each applicant. In this way, very detailed analyses can be performed on each admissions group well before drastic action is the only alternative left.

For the past two years, a "cutoff" date for applications was implemented for the most competitive group of new freshmen applicants. The setting of a date like this is based on forecasts of expected show rates largely gotten from Monte Carlo and from members of the Ad Hoc Admissions/Enrollment Committee. In fact, as the admissions cycle moves into early spring, Institutional Research's role in forecasting freshmen enrollment often decreases in deference to the Offices of Housing and Registration. Both of these offices have data (e.g., deposits for housing, requests for course registration) which are better predictors of new freshmen enrollment than are confirmations. So while Institutional Research is still important in the decision-making process, it is now not the only office with relevant data, whereas it was earlier in the admissions cycle.

Just as the Office of Institutional Research's role is decreasing in spring, it is increasing for new transfer applicants, who apply much later in the cycle than do freshmen. A similar process is followed for transfers, although timing of application flow is all-important, as cutoff dates for transfers have also been implemented in the last two years.

Epilogue

In early September of each year, those taking part in the enrollment-management process at NIU are able to see how well they did in meeting new freshmen and transfer targets. For Fall 1988, the author and his colleagues met with mixed success. The new freshmen target was 3,150 (the lowest in some time because of severe funding limitations) and actual enrollment was 3,137 - a success. However, the show rate was overestimated for the most competitive group, and if other groups had not enrolled at higher-than-expected rates, the target would not have been approached so closely. The transfer target was 1,900, and actual enrollment was 1,762 - <u>not</u> a success. Apparently, NIU's transfer cutoff date had been anticipated by Illinois two-year institutions, but not by Illinois four-year and out-of-state institutions. The result was a very low show rate, particularly from Illinois four-year schools. For all of the detailed, seemingly sophisticated analyses done, it was a consumer behavior aspect of enrollment management that doomed the transfer analysis.

In fact, show rates have proven time and again to be <u>very</u> difficult to predict using quantitative analysis alone. That is why the Ad Hoc Admissions/Enrollment Committee has become so valuable - it affords decision makers the opportunity to hear from those offices that deal directly with potential students and can anticipate changing demand patterns not reflected in the numbers.

Summary

While enrollment management is a difficult function because of its uncertainty and inconsistency over time, it can be made easier through better modeling techniques, a better understanding of the environment, and more cooperation among different offices on campus. At NIU, the Ad Hoc Admissions/Enrollment Committee has been instrumental in promoting cooperation among enrollment managers, and the input of its members has helped the Office of Institutional Research develop more effective models for predicting enrollment.

This paper has discussed some of the techniques used to better understand the admissions and demand environments and NIU's place in them. While far from perfect, these techniques, coupled with the experience gained from each year's successes and failures, have helped make the enrollment-management process at NIU much less uncertain and unpredictable.

High School Seniors in NIU Market Area

Fall 1976 - Fall 2003

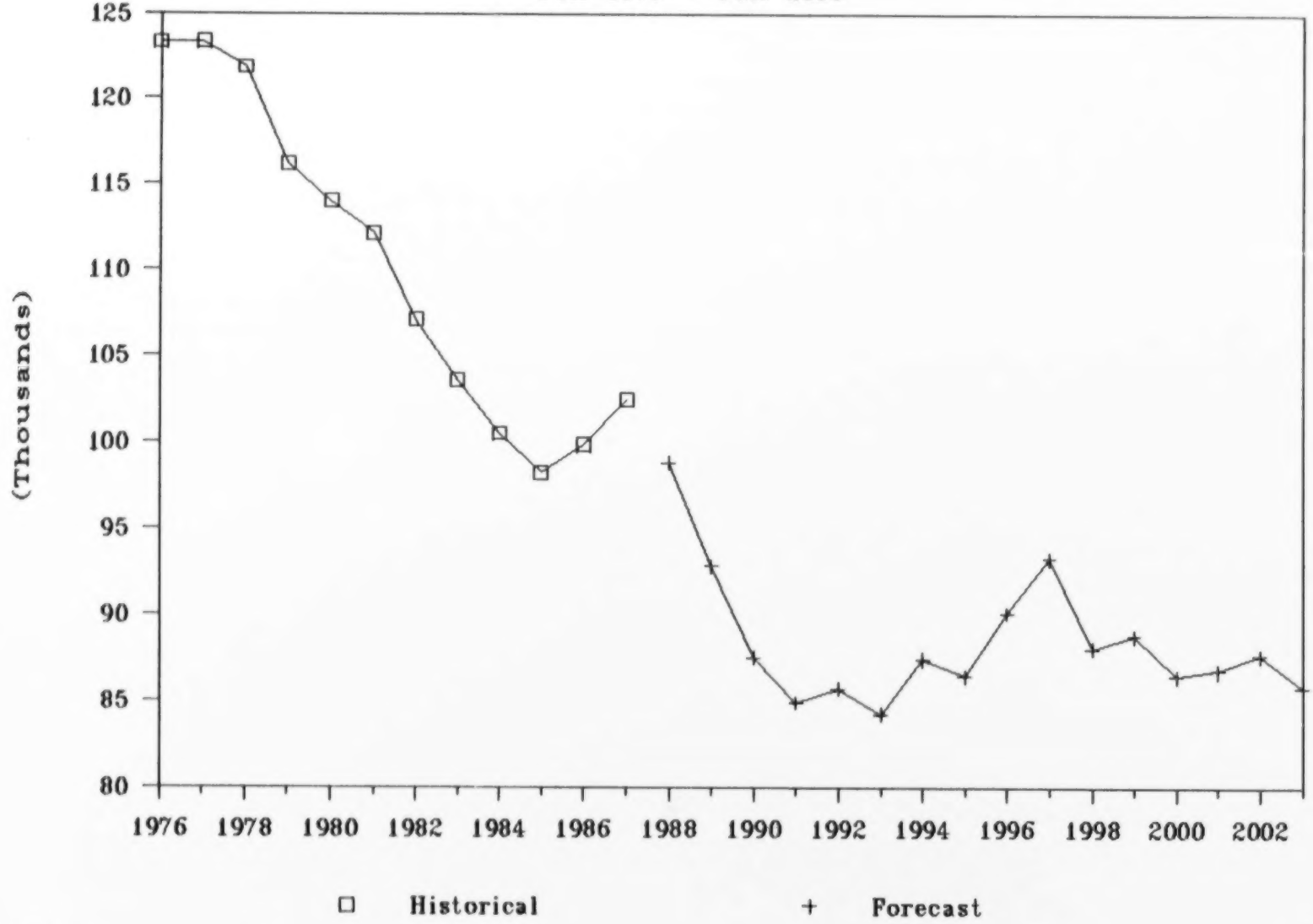

Exhibit One

Confirmed and Enrolled New Freshmen

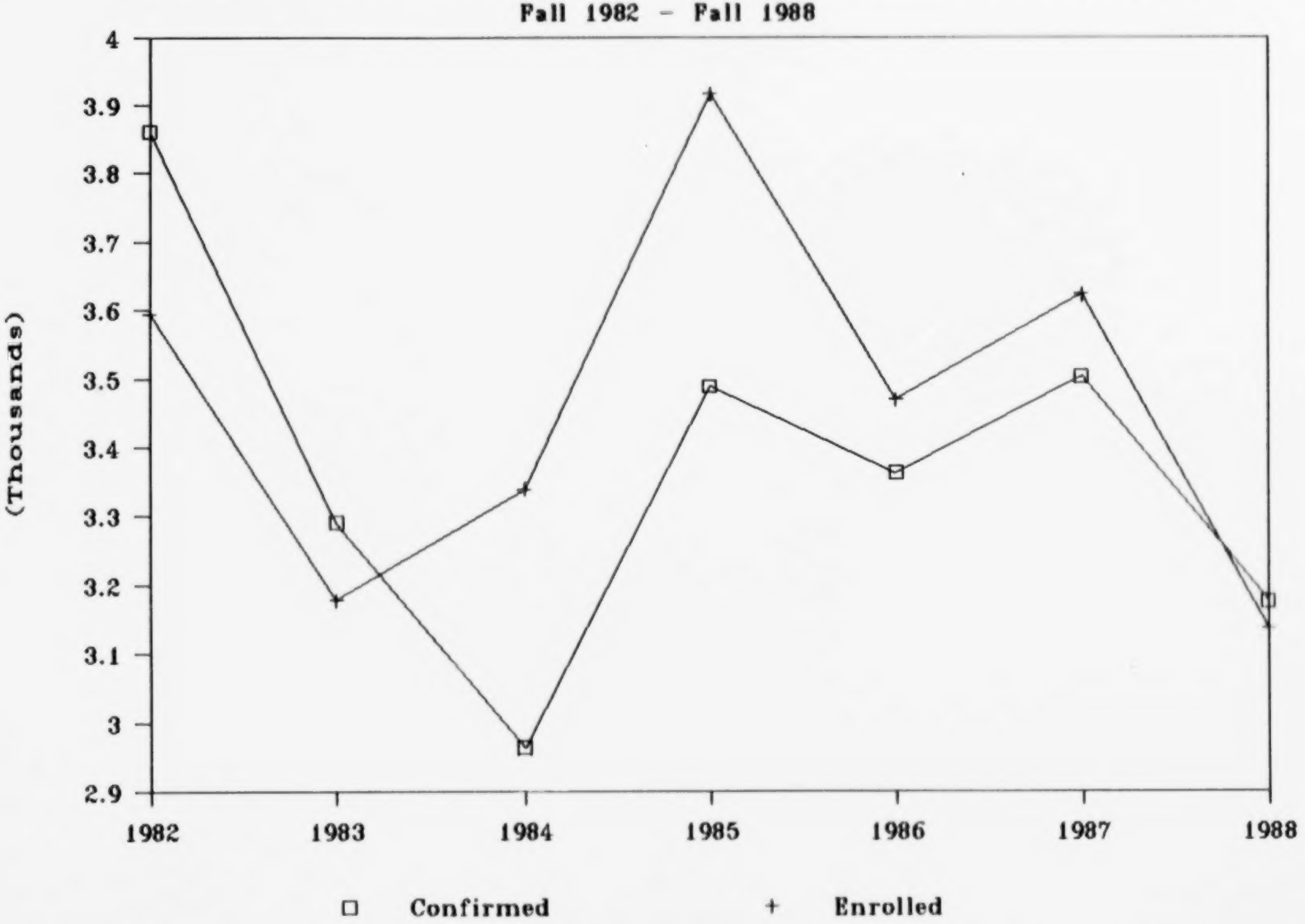

Exhibit Two

Exhibit Three

Admissions Summary by Group for New Freshmen, Fall 1988

Admissions Classification	Acceptance Rate	Show Rate
Most Competitive	96.1%	34.2%
Other Regular Groups	6.6%	57.1%
CHANCE	34.7%	78.7%
Sponsored	100.0%	66.2%
Other Special Groups	53.3%	32.0%
ALL NEW FRESHMEN	59.0%	38.6%

Cumulative Probability Distribution

for Monte Carlo Enrollment Simulation

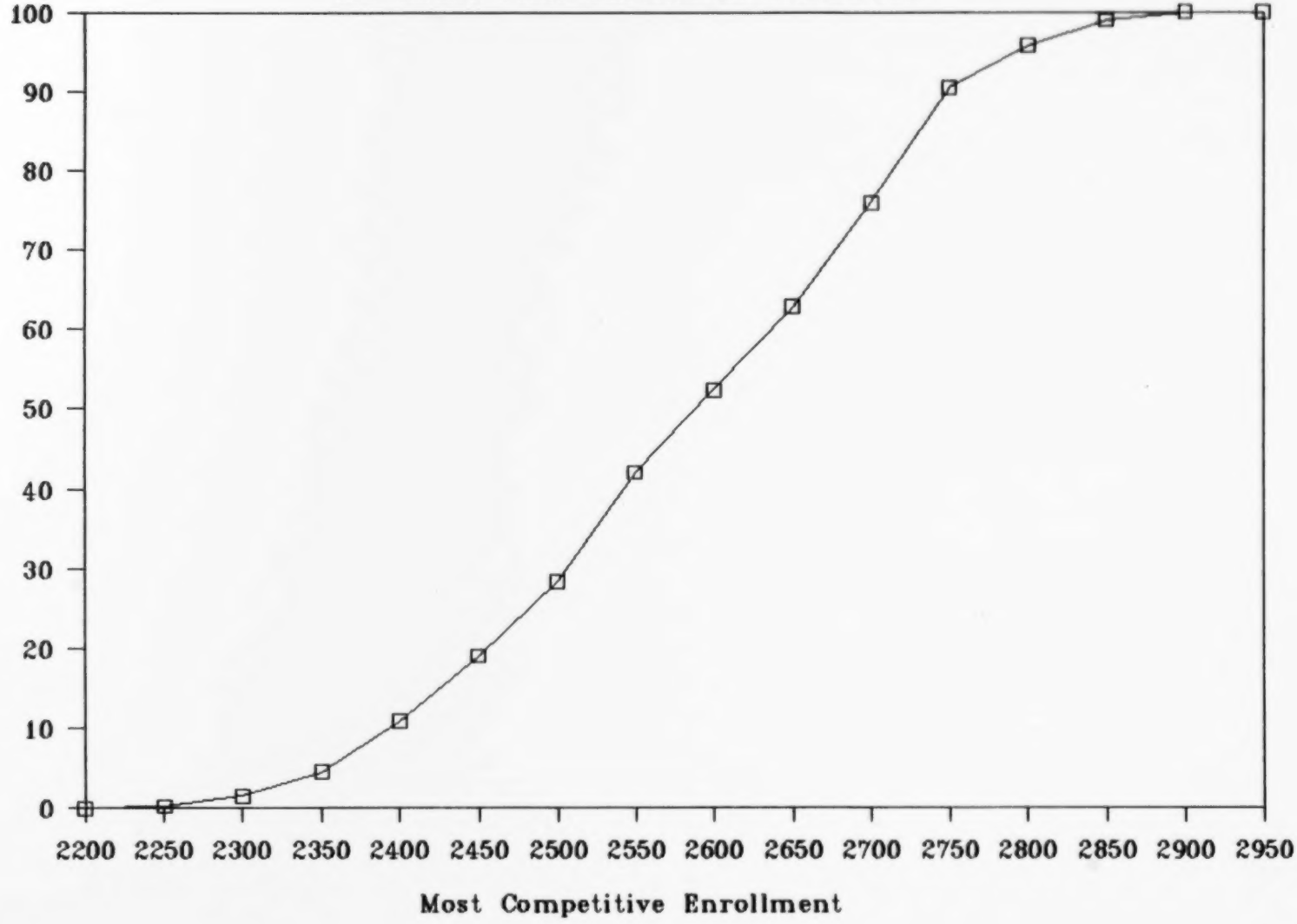

Exhibit Four